LAKE BERRYESSA RESORT IMPROVEMENT DISTRICT

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June 1, 2012

Mr. Guy Childs
Central Valley Region Regional Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670

RE: Lake Berryessa Resort Improvement District
Groundwater Monitoring Well Installation Report
Administrative Civil Liability (ACL) Order R5-2011-0538, Revision No. 1

Dear Mr. Childs:

This Groundwater Monitoring Well Installation Report is provided to the Regional Water Quality Control Board (RWQCB) in accordance with the Groundwater Monitoring Well Installation Work Plan (Work Plan) dated March 15, 2012. The Report discusses the drilling, construction, and development of two (2) groundwater monitoring wells located in the vicinity of the wastewater ponds operated by the Lake Berryessa Resort Improvement District (LBRID or District).

A. GENERAL INFORMATION

Items #2 and #4, page 14 of the Administrative Civil Liability Order No. R5-2011-0538, Revision No. 1 (ACL) required the District to prepare a work plan and install two additional groundwater monitoring wells. This Report has been prepared in accordance to Item #4 of the ACL which states:

> *By **June 1, 2012**, the Discharger shall submit a Monitoring Well Installation Report prepared in accordance with, and including the items listed in, the second section of Attachment B. The report shall describe the installation and development of the two new monitoring wells and explain any deviation from the approved work plan.*

The two recently-installed groundwater monitoring wells will be used to obtain information for the RWQCB as outlined in the Work Plan and Monitoring and Reporting Program (MRP) R5-2008-0068. The information provided shall be in compliance with that identified in the MRP and the existing Groundwater Sampling and Analysis Plan (SAP), dated May 31, 2006. The MRP specifies a program of groundwater monitoring to evaluate the effect of the wastewater ponds on groundwater in the vicinity of the treatment, storage, and disposal facilities.

Please see Attachment A for the location of the two recently installed groundwater monitoring wells in relation to the ponds and existing monitoring wells. Construction of the new monitoring wells were conducted under permit #E12-00247 (see Attachment B) issued by Napa County Department of Environmental Management.

Hydrogeologic Setting

The wastewater ponds are located in a remote upland area immediately north of Stone Corral Creek, which flows in a general east to southeasterly direction towards Putah Creek, which in turn flows into Lake Berryessa. Hydrogeology and groundwater conditions in the immediate vicinity of the LBRID facility are not well known and there are no nearby groundwater wells used for domestic or irrigation purposes. The surface soils in the immediate area of the ponds are alluvial materials on the flanks of hills ranging in elevation to approximately 1,000 feet. The bed of Stone Corral Creek is at an elevation of approximately 520 feet immediately southeast of Pond 5.

Groundwater flow in the alluvium generally follows topography and trends southeasterly towards Stone Corral Creek. It is likely that groundwater in the alluvium is in hydraulic communication with Stone Corral Creek. The underlying bedrock in the upland areas is not known to yield significant groundwater to wells.

B. WELL DRILLING & CONSTRUCTION

The two groundwater monitoring wells were constructed in May 2012 by Clear Heart Drilling, Inc. (Contractor) (License A,B,C-57 #780357) of Santa Rosa, California. The Contractor constructed Monitoring Well (MW) 6 and MW7 on May 24 and 18, 2012, respectively. Please refer to Attachment C for the boring and well construction logs.

The method of construction for MW6 and MW7 consisted of drilling a 4" pilot boring with a solid stem auger. Upon encountering the first indication of groundwater, the depth was noted on the boring logs, and the pilot borings were then planned to be continued an additional 15-feet into the saturated zone or until refusal. Soil lithology was evaluated and logged over the entire length of boring based upon drill cuttings. Upon completion of the pilot boring, a well boring was conducted with an 8" or 10" hollow-stemmed auger (HSA).

The wells were constructed with 2" Schedule 40 polyvinyl chloride (PVC) slotted screen (0.01") 15 feet in length through the saturated zone and fitted with a PVC slip cap at the bottom. The well casing extended to approximately 2 to 3 feet above the ground surface with 2" Schedule 40 PVC casing. The annulus of the wells were backfilled with a filter pack material consisting of #212 silica sand to approximately 2 feet above the slotted screen PVC, and the Contractor placed approximately 2 feet of hydrated bentonite chips above the filter pack and completed the backfill with cement-bentonite grout to surface grade. The well casings were encased with a 4" square steel monument casing cemented to the well head at the ground surface and fitted with a locking cap.

Drilling and construction of MW6 occurred over a 2-day period. During the drilling of MW6 on May 18th the lithology encountered was hard-pack clay with no evidence of ground water. When the boring finally hit refusal around 50' below ground surface, the Contractor recommended that the boring be left overnight and the well be built shortly thereafter assuming the site yielded groundwater. On the morning of May 21st District Staff observed water in the boring and the Contractor completed the construction of the well, as described above and in accordance to the Work Plan, on May 24th.

C. WELL DEVELOPMENT

District staff contracted with Confluence Environmental, Inc (CE) to develop the wells in accordance with the approved Work Plan and Groundwater Sampling and Analysis Plan (SAP). On May 31, 2012, CE developed MW6 and MW7. Please see Attachment D for field notes taken during the well development.

The well development consisted of having the screened interval swabbed, bailed, and pumped. Water quality parameters including pH, conductivity, temperature, oxidation/reduction potential (redox), and turbidity were monitored during pumping development activities.

CE started developing MW-6 in the morning and it was noted that the well went dry prior to purging five well casing volumes. MW-6 was allowed to recharge during a 5-hour time period and CE started developing the well again in the afternoon. The second try at developing the well yielded only an additional 0.5 well casing volumes, which results in a total of approximately 5.5 well casing volumes. The purged well water appeared very clear and the water quality parameters appeared to be stable over the course of the development, therefore no additional development was conducted.

During the development of MW-7, CE removed the required volume as specified in the Work Plan (10 well casing volumes) and noted that the water quality parameters were stabilized, except for turbidity remained high (>1000 NTUs). In an effort to minimize the turbidity in the well, CE continued development and removed an additional 6 well casing volumes. Turbidity in the monitoring well improved visually, but remained in excess of 1000 NTUs. Staff will monitor water quality conditions and report the results of the June sampling in the Second Quarter Monitoring Report 2012.

D. WELL SURVEY

On May 30, 2012, Staff (which included a Licensed Land Surveyor) conducted a survey of the well head locations and elevations. Existing monitoring wells and site control were previously tied into State Plane Coordinate System, by Horizon Land Surveys, Inc. on May 21, 2007 and were used as the basis for this survey. Accordingly, the recently completed survey will be on NAD 83 Horizontal Control Coordinates and the vertical datum will be NGVD 29.

The tops of the well casings with their cap removed and the ground surface elevation were surveyed to the nearest 0.01 feet. Please see Attachment E for the Surveyor's report which includes field notes from the survey.

E. CONCLUSION & PLANNED ACTIONS

The recently constructed and developed wells will be incorporated into the routine quarterly monitoring and sampling program. Staff anticipates that all seven (7) monitoring wells will be sampled the first week of June in order to meet the August 1, 2012 deadline to submit the Second Quarter Monitoring Report. Ongoing monitoring of the two new wells should provide information regarding the up-gradient and down-gradient groundwater quality for the proposed wastewater treatment, storage and disposal expansion.

This concludes the well installation report for the groundwater monitoring wells located at the LBRID facility. If you have any questions on this matter, please contact me at (707) 259-8657.

Sincerely,

Richard M. Thomasser, P.G.
Watershed Operations Manager

Cc: Phillip M. Miller, P.E.
Kevin L. Berryhill, P.E.
Anna Maria Martinez

Encl.

RP/RT